



BAW56SRA

Quad high-speed switching diodes

14 September 2018

Product data sheet

1. General description

Quad high-speed switching diodes with common anode configurations encapsulated in a leadless ultra small DFN1412-6 (SOT1268) Surface-Mounted Device (SMD) plastic package.

2. Features and benefits

- High switching speed: $t_{rr} \leq 4$ ns
- Low leakage current
- Reverse voltage $V_R \leq 90$ V
- Low capacitance $C_d \leq 2$ pF
- Ultra small SMD plastic package
- AEC-Q101 qualified

3. Applications

- High-speed switching
- General-purpose switching

4. Quick reference data

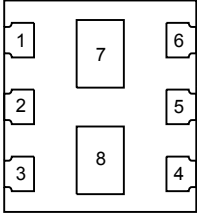
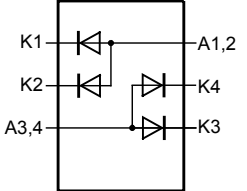
Table 1. Quick reference data

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|------------------|-----------------------|---|-----|-----|-----|------|------|
| Per diode | | | | | | | |
| I_F | forward current | single diode loaded; $T_{amb} = 25$ °C | [1] | - | - | 375 | mA |
| I_R | reverse current | $V_R = 80$ V; pulsed; $T_j = 25$ °C | | - | - | 0.5 | µA |
| V_F | forward voltage | $I_F = 150$ mA; $t_p \leq 300$ µs; $\delta \leq 0.02$; $T_j = 25$ °C | | - | - | 1.25 | V |
| V_R | reverse voltage | $T_j = 25$ °C | | - | - | 90 | V |
| t_{rr} | reverse recovery time | $I_F = 10$ mA; $I_R = 10$ mA; $R_L = 100$ Ω; $I_{R(meas)} = 1$ mA; $T_{amb} = 25$ °C | | - | - | 4 | ns |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

5. Pinning information

Table 2. Pinning information

| Pin | Symbol | Description | Simplified outline | Graphic symbol |
|-----|--------|--------------------------|---|---|
| 1 | K1 | cathode (diode 1) |  <p>Transparent top view DFN1412-6 (SOT1268)</p> |  <p>aaa-026796</p> |
| 2 | K2 | cathode (diode 2) | | |
| 3 | A3,4 | com. anode (diodes 3, 4) | | |
| 4 | K3 | cathode (diode 3) | | |
| 5 | K4 | cathode (diode 4) | | |
| 6 | A1,2 | com. anode (diodes 1, 2) | | |
| 7 | A1,2 | com. anode (diodes 1, 2) | | |
| 8 | A3,4 | com. anode (diodes 3, 4) | | |

6. Ordering information

Table 3. Ordering information

| Type number | Package | | |
|-------------|-----------|---|---------|
| | Name | Description | Version |
| BAW56SRA | DFN1412-6 | plastic, thermal enhanced ultra thin small outline package; no leads; 6 terminals; 1.4 mm x 1.2 mm x 0.47 mm body | SOT1268 |

7. Marking

Table 4. Marking codes

| Type number | Marking code |
|-------------|--------------|
| BAW56SRA | A2 |

8. Limiting values

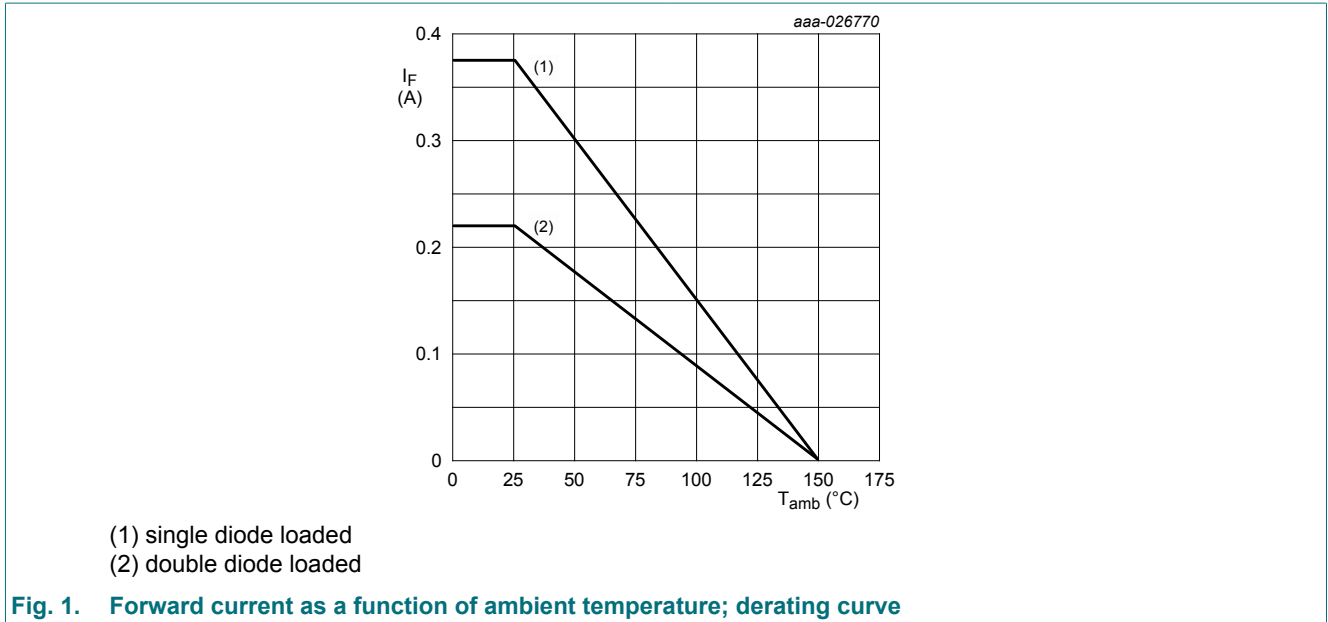
Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

| Symbol | Parameter | Conditions | | Min | Max | Unit |
|-------------------------------------|-------------------------------------|--|-----|-----|-----|------|
| Per diode | | | | | | |
| V_R | reverse voltage | $T_j = 25\text{ °C}$ | | - | 90 | V |
| I_F | forward current | single diode loaded; $T_{amb} = 25\text{ °C}$ | [1] | - | 375 | mA |
| | | double diodes loaded; $T_{amb} = 25\text{ °C}$ | [1] | - | 220 | mA |
| I_{FSM} | non-repetitive peak forward current | $t_p = 100\text{ }\mu\text{s}$; $T_{j(\text{init})} = 25\text{ °C}$; square wave | | - | 4 | A |
| | | $t_p = 1\text{ ms}$; $T_{j(\text{init})} = 25\text{ °C}$; square wave | | - | 1.5 | A |
| | | $t_p = 1\text{ s}$; $T_{j(\text{init})} = 25\text{ °C}$; square wave | | - | 0.5 | A |
| I_{FRM} | repetitive peak forward current | $t_p \leq 0.5\text{ ms}$; $\delta \leq 0.25$ | | - | 1 | A |
| Per device; one diode loaded | | | | | | |
| P_{tot} | total power dissipation | $T_{amb} \leq 25\text{ °C}$ | [1] | - | 410 | mW |
| | | | [2] | - | 610 | mW |
| T_j | junction temperature | | | - | 150 | °C |
| T_{amb} | ambient temperature | | | -55 | 150 | °C |
| T_{stg} | storage temperature | | | -65 | 150 | °C |

[1] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated and standard footprint.

[2] Device mounted on an FR4 Printed-Circuit Board (PCB), single-sided copper, tin-plated mounting pad for cathode 1 cm^2 .



9. Thermal characteristics

Table 6. Thermal characteristics

| Symbol | Parameter | Conditions | | Min | Typ | Max | Unit |
|----------------|--|-------------|-----|-----|-----|-----|------|
| $R_{th(j-a)}$ | thermal resistance from junction to ambient | in free air | [1] | - | - | 305 | K/W |
| | | | [2] | - | - | 205 | K/W |
| $R_{th(j-sp)}$ | thermal resistance from junction to solder point | | [3] | - | - | 40 | K/W |

- [1] Device mounted on an FR4 PCB, single-sided copper, tin-plated and standard footprint.
- [2] Device mounted on an FR4 PCB, single-sided copper, tin-plated mounting pad for cathode 1cm².
- [3] Soldering point of anode tab.

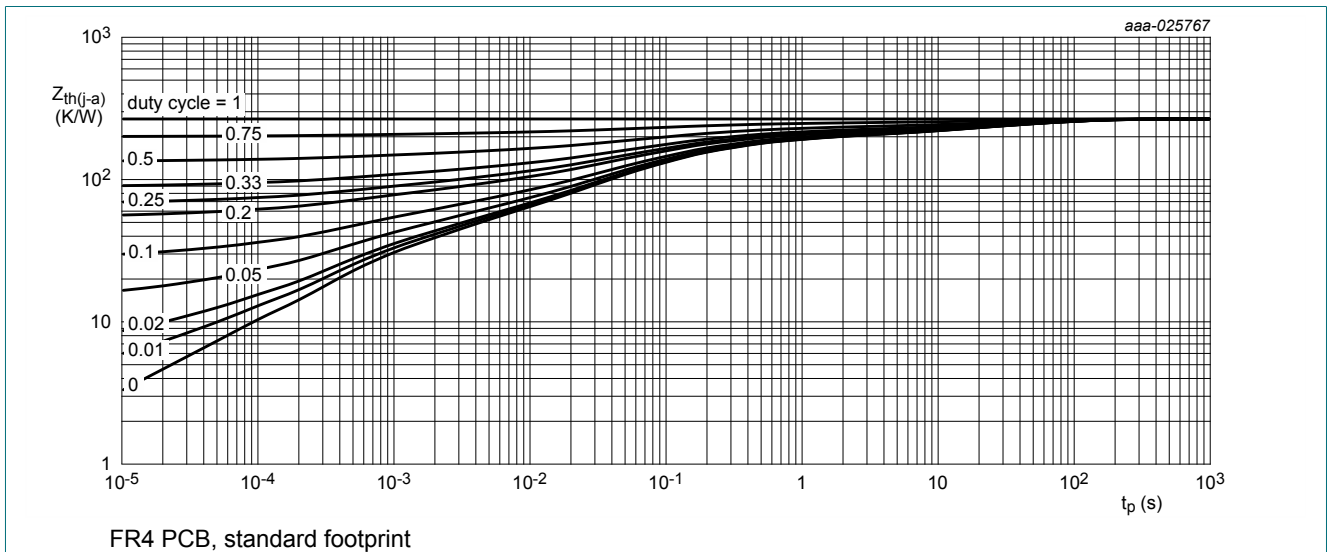


Fig. 2. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

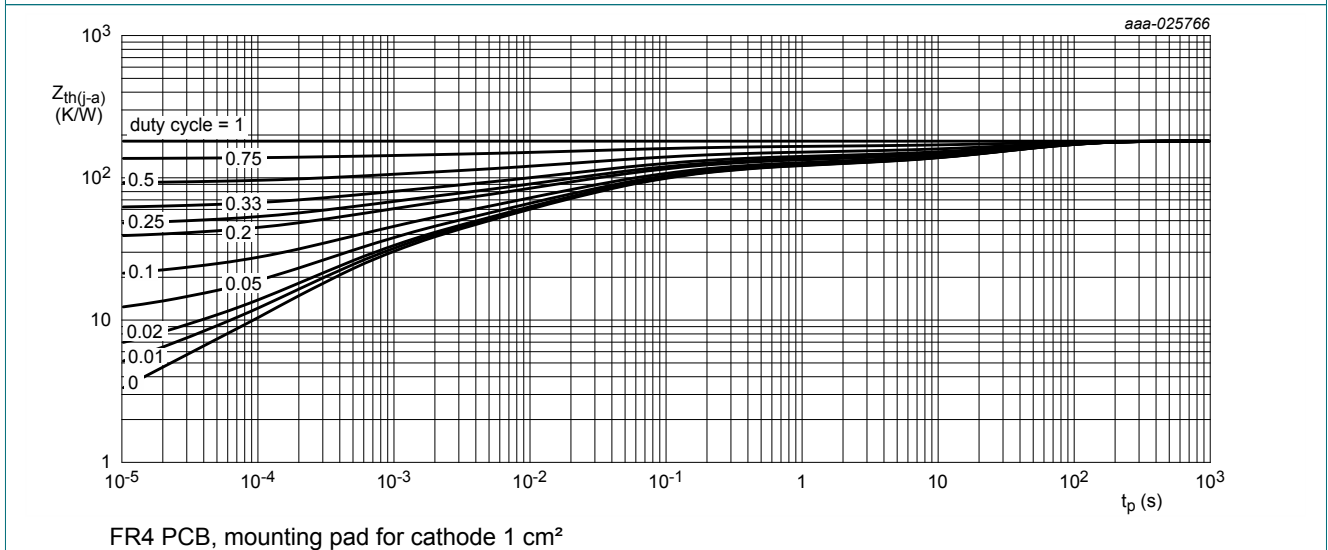
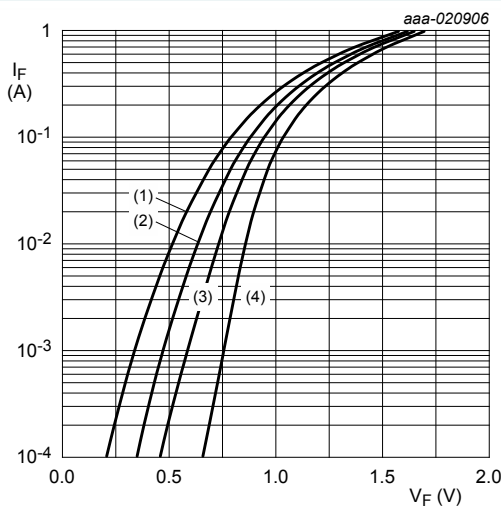


Fig. 3. Transient thermal impedance from junction to ambient as a function of pulse duration; typical values

10. Characteristics

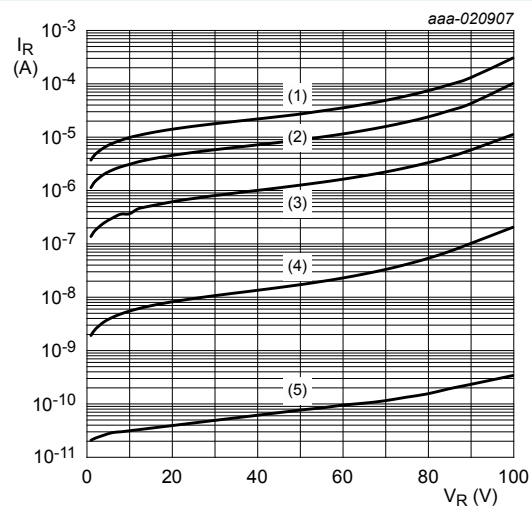
Table 7. Characteristics

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|------------------|-------------------------------|--|-----|-----|------|---------------|
| Per diode | | | | | | |
| V_F | forward voltage | $I_F = 1 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 715 | mV |
| | | $I_F = 10 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 855 | mV |
| | | $I_F = 50 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 1 | V |
| | | $I_F = 150 \text{ mA}; t_p \leq 300 \mu\text{s}; \delta \leq 0.02;$ $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 1.25 | V |
| I_R | reverse current | $V_R = 25 \text{ V};$ pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 30 | nA |
| | | $V_R = 80 \text{ V};$ pulsed; $T_j = 25 \text{ }^\circ\text{C}$ | - | - | 0.5 | μA |
| | | $V_R = 25 \text{ V};$ pulsed; $T_j = 150 \text{ }^\circ\text{C}$ | - | - | 30 | μA |
| | | $V_R = 80 \text{ V};$ pulsed; $T_j = 150 \text{ }^\circ\text{C}$ | - | - | 150 | μA |
| C_d | diode capacitance | $V_R = 0 \text{ V}; f = 1 \text{ MHz}; T_j = 25 \text{ }^\circ\text{C}$ | - | - | 2 | pF |
| t_{rr} | reverse recovery time | $I_F = 10 \text{ mA}; I_R = 10 \text{ mA}; R_L = 100 \Omega;$ $I_{R(\text{meas})} = 1 \text{ mA}; T_{\text{amb}} = 25 \text{ }^\circ\text{C}$ | - | - | 4 | ns |
| V_{FRM} | peak forward recovery voltage | $I_F = 10 \text{ mA}; t_r = 20 \text{ ns}$ | - | - | 1.75 | V |



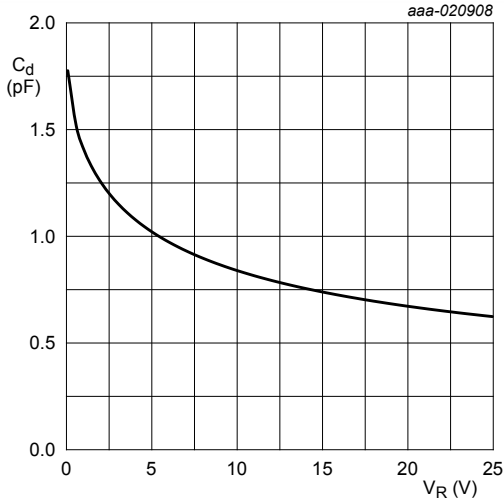
- (1) $T_j = 150 \text{ }^\circ\text{C}$
- (2) $T_j = 85 \text{ }^\circ\text{C}$
- (3) $T_j = 25 \text{ }^\circ\text{C}$
- (4) $T_j = -40 \text{ }^\circ\text{C}$

Fig. 4. Forward current as a function of forward voltage; typical values



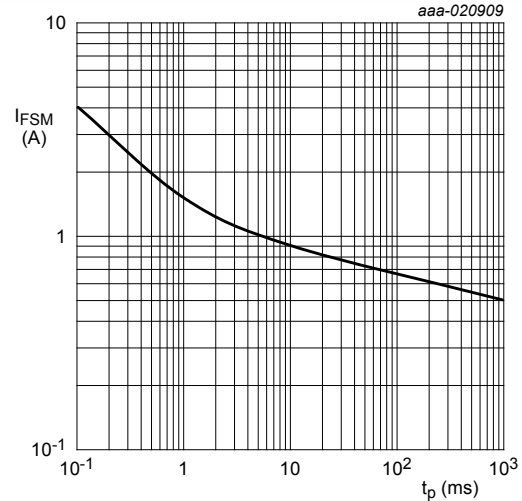
- (1) $T_j = 150 \text{ }^\circ\text{C}$
- (2) $T_j = 125 \text{ }^\circ\text{C}$
- (3) $T_j = 85 \text{ }^\circ\text{C}$
- (4) $T_j = 25 \text{ }^\circ\text{C}$
- (5) $T_j = -40 \text{ }^\circ\text{C}$

Fig. 5. Reverse current as a function of reverse voltage; typical values



$f = 1\text{MHz}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$

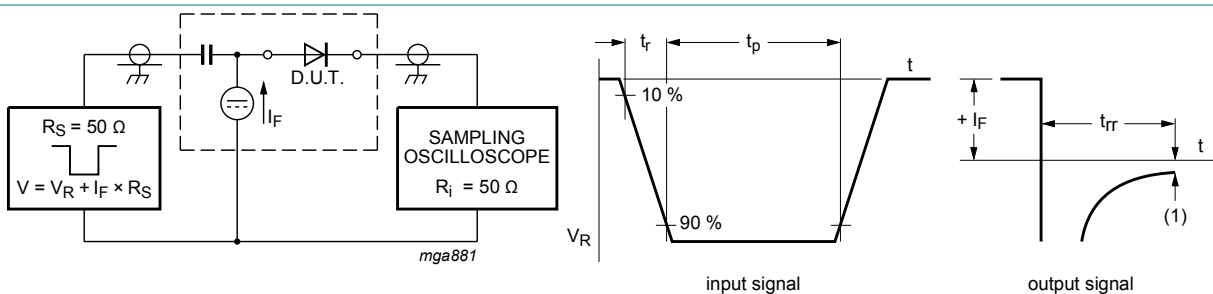
Fig. 6. Diode capacitance as a function of reverse voltage; typical values



Based on square wave currents.
 $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$

Fig. 7. Non-repetitive forward current as a function of pulse duration; maximum values

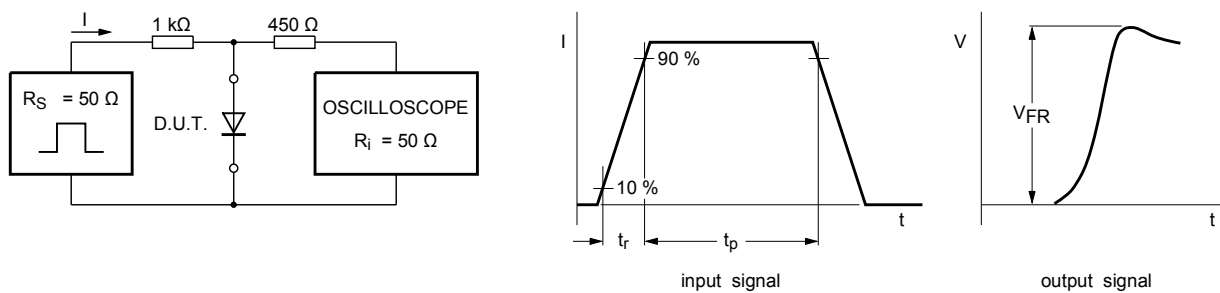
11. Test information



(1) $I_R = 1\text{ mA}$

Input signal: reverse pulse rise time $t_r = 0.6\text{ ns}$; reverse voltage pulse duration $t_p = 100\text{ ns}$; duty cycle $\delta = 0.05$
Oscilloscope: rise time $t_r = 0.35\text{ ns}$

Fig. 8. Reverse recovery time test circuit and waveforms



Input signal: forward pulse rise time $t_r = 20\text{ ns}$; forward current pulse duration $t_p \geq 100\text{ ns}$; duty cycle $\delta \leq 0.005$

Fig. 9. Forward recovery voltage test circuit and waveforms

Quality information

This product has been qualified in accordance with the Automotive Electronics Council (AEC) standard Q101 - Stress test qualification for discrete semiconductors, and is suitable for use in automotive applications.

12. Package outline

DFN1412-6: plastic thermal enhanced ultra thin small outline package; no leads; 6 terminals; body: 1.4 x 1.2 x 0.47 mm

SOT1268

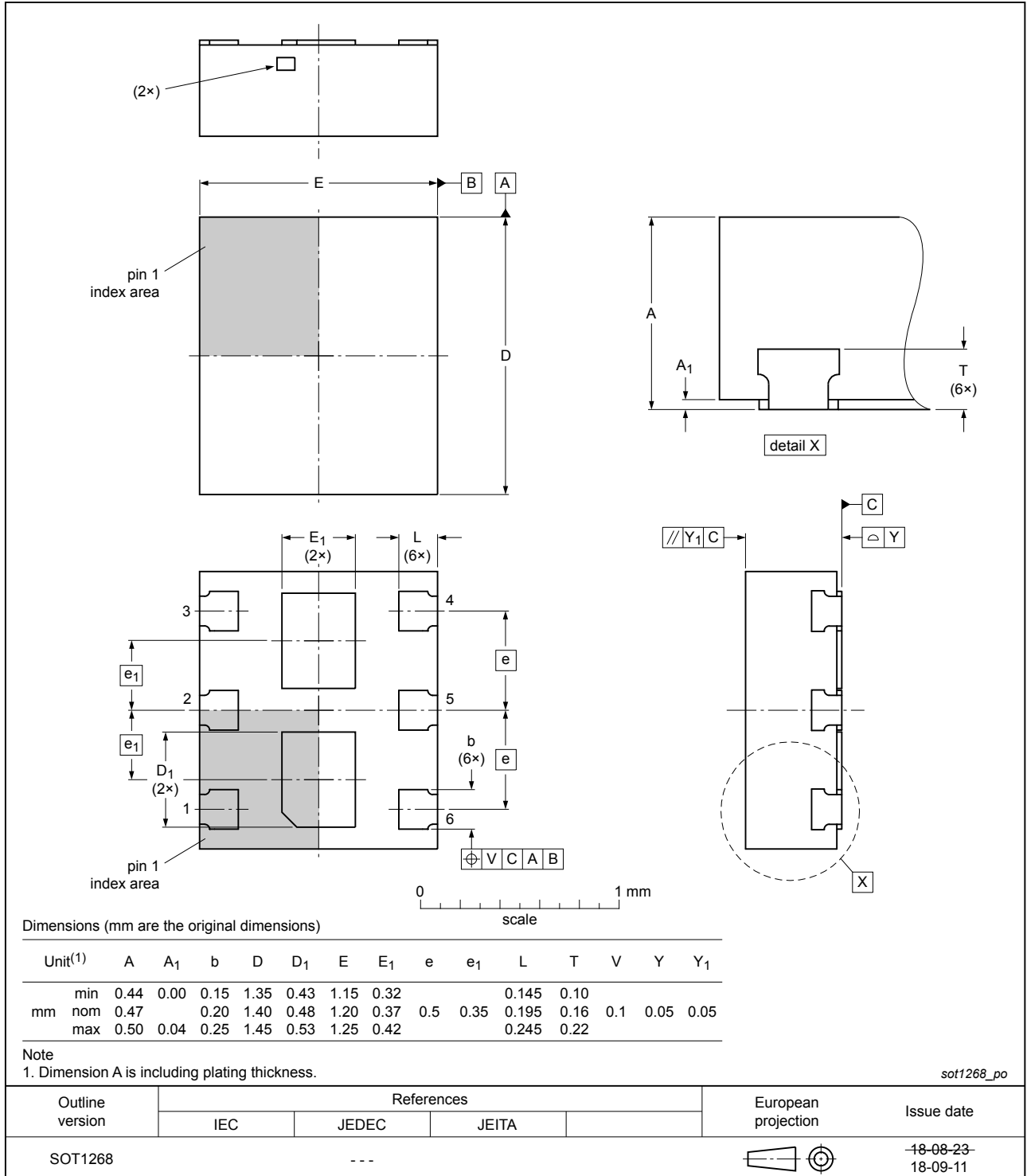


Fig. 10. Package outline DFN1412-6 (SOT1268)

13. Soldering

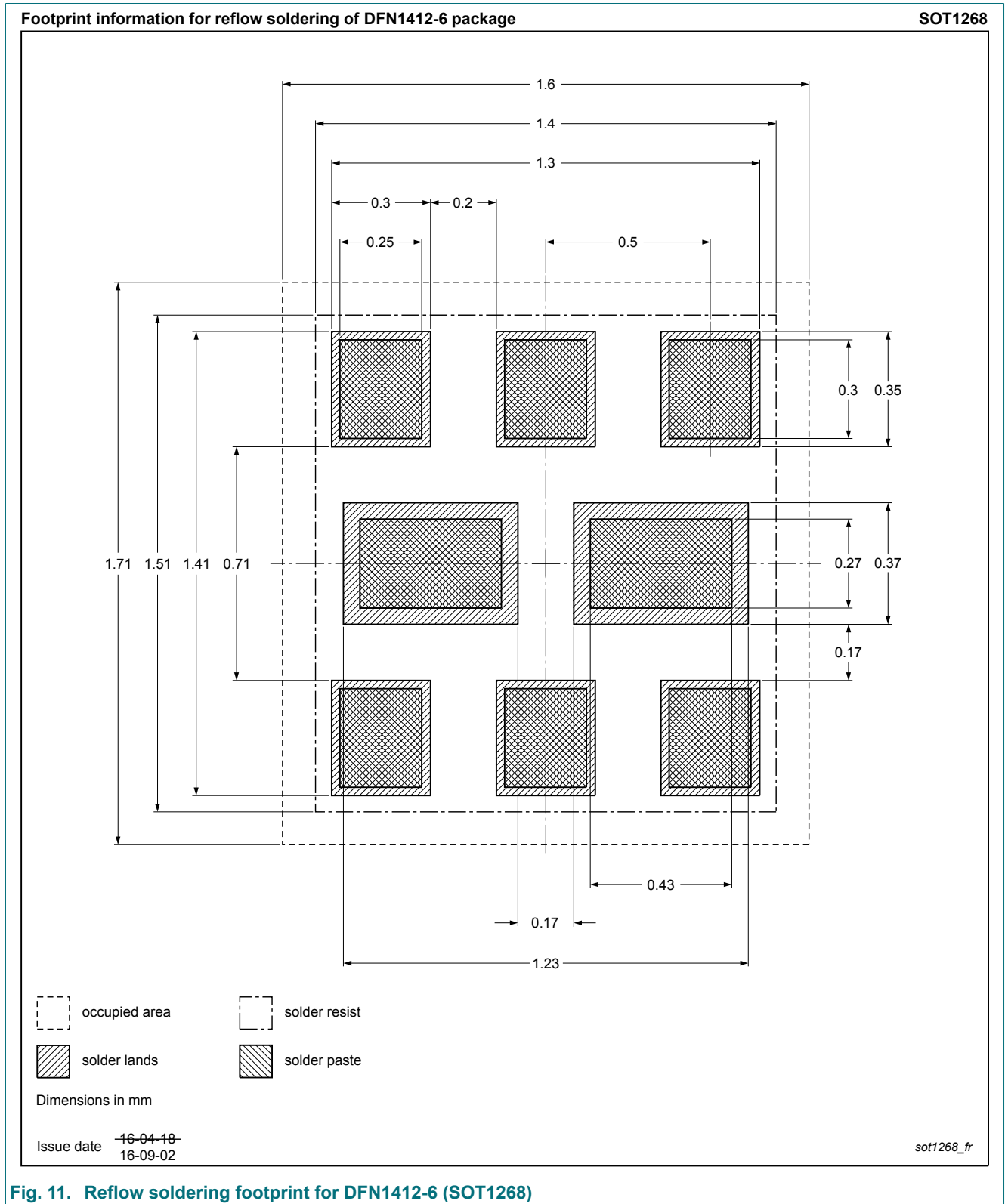


Fig. 11. Reflow soldering footprint for DFN1412-6 (SOT1268)

14. Revision history

Table 8. Revision history

| Data sheet ID | Release date | Data sheet status | Change notice | Supersedes |
|---------------|---|--------------------|---------------|--------------|
| BAW56SRA v.2 | 20180914 | Product data sheet | - | BAW56SRA v.1 |
| | • Package outline drawing updated: Unit T added | | | |
| BAW56SRA v.1 | 20170626 | Product data sheet | - | - |

15. Legal information

Data sheet status

| Document status [1][2] | Product status [3] | Definition |
|--------------------------------|--------------------|---|
| Objective [short] data sheet | Development | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet | Qualification | This document contains data from the preliminary specification. |
| Product [short] data sheet | Production | This document contains the product specification. |

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- [2] The term 'short data sheet' is explained in section "Definitions".
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